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### RECENT VIEWS REGARDING THE PATHOLOGY AND TREATMENT OF PERTUSSIS.<sup>1</sup>

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THE present era is one of important and far-reaching change in medical opinion, more particularly as regards the essential nature of many of the most prevalent maladies. It is not at all surprising, therefore, to find recent views concerning pertussis differing materially from those which were accepted ten, or even five, years ago. With the advent of new ideas on pathology, new methods of treatment have naturally arisen. The purpose of this paper is to give a brief account of the more important views recently enunciated concerning the pathology and treatment of pertussis. The inquiry will also be pertinent, whether we have made any true progress in these directions, or whether we have to do merely with the rising tide of popular innovation.

In the first place, then, What is the nature of pertussis?

The drift of modern research runs almost exclusively in one direction, namely, that of regarding whooping-cough as a disease due to the invasion of microorganisms.

But while most modern observers are ready to admit the parasitic origin of the affection, considerable differences of opinion obtain regarding the particular kind of organism supposed to be specific, as well as the precise point of its location within the body.

As long ago as 1870, Letzerich<sup>2</sup> described a micro-organism alleged to be present in the sputum, and on the mucous membrane of the respiratory organs of patients having pertussis. His observations were soon confirmed by some writers, but others disputed his claims. The most recent researches have resulted in showing that the organisms of Letzerich are harmless saprophytes, and not the pathogenic microbes of pertussis.

The organism discovered by Tschamer<sup>1</sup> is identical with the fungus known as *capnodium citri*, which is found on orange-peel and apples. It is certainly not the specific microbe of pertussis.

Deichler,<sup>2</sup> of Frankfurt, has also discovered an organism in this disease. And, strangely enough, it is not a minute plant, but an animal belonging to the protozoa. This author makes the rather guarded statement that, while the animalcule in question occurs only in pertussis, and evidently has some pathogenic significance, it may not be the sole exciting cause of the disease. It will strike the reader that a more modest microorganism has not of late years been discovered on German soil, a circumstance which probably accounts for the contempt in which it appears to be held by those German writers who take the trouble to mention it at all.

Henke<sup>3</sup> has described small round cells, which he found in the sputum, and which he supposed to be peculiar to pertussis. From his description, however, it is clear that they were merely lymph corpuscles, showing in their interior the well-known phenomenon of molecular movement.

Poulet's<sup>4</sup> *monas termo* and *bacterium termo* have nothing to do with pertussis, and the Frenchman's claims in an opposite direction cannot be upheld.

In 1883, Burger<sup>5</sup> found a small rod-shaped organism in the sputum of patients having pertussis. He regards it as the exciting cause of the disease. But the methods employed by Burger are not above criticism, and Koch has refused to accept his arguments as convincing.<sup>6</sup> Cultures and inoculation experiments were not made by Burger. From his description it is apparent that he did not see the bacillus of Afanasieff, presently to be considered.

All these observations (as well as a number of others that need not be mentioned here) were undeniably prompted by the *à priori* consideration that pertussis ought to be due to the presence of a micro-organism. Indeed, not a few authors have taken the ground that while we might not yet know all about the presumed microbe, treatment, in order to be rational and effectual, must be chiefly of the anti-parasitic kind.

So long as ten years ago Hagenbach<sup>7</sup> maintained that whooping-cough was a catarrhal affection of the mucous membrane of the respiratory tract, associated with the invasion of fungi. According to this author, the characteristic paroxysms of cough are due to reflex action, starting from irritation of the terminal filaments of the superior laryngeal nerve.

<sup>1</sup> Deutsche med. Wochenschrift, April 7, 1887, and Jahrbuch für Kinderheilkunde, vol. x.

<sup>2</sup> Deutsche medizin. Zeitung, No. 37, 1886.

<sup>3</sup> Deutsches Archiv für klin. Med., vol. xii. p. 630.

<sup>4</sup> Comptes Rendus de l'Acad. des Sciences.

<sup>5</sup> Berliner klin. Wochenschrift, No. 1, 1883.

<sup>6</sup> Fortschritte der Medicin., vol. i. p. 108.

<sup>7</sup> Gerhardt's Handbuch der Kinderkrankheiten, vol. ii. p. 551.

<sup>1</sup> Read before the New York Academy of Medicine, Section on Pædiatrics, April 25, 1888.

<sup>2</sup> Virchow's Archiv, vol. xlix.



Widerhofer<sup>1</sup> describes whooping-cough as a bronchomycosis.

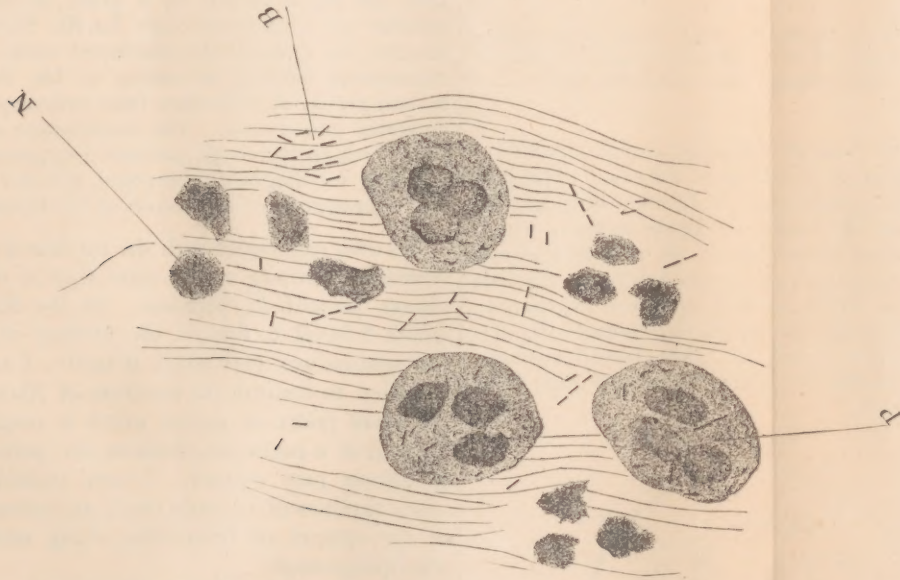
Baginsky<sup>2</sup> places the disease among the constitutional infectious maladies. But by calling it an infectious catarrh of the mucous membrane of the respiratory passages, he admits that it may just as well be classed with the "local contagious" maladies.

Michael,<sup>3</sup> of Hamburg, following the suggestions of Hack, Schadowald, Sommerbrodt, Wille, and others, asserts that the disease is due to reflex disturbances, caused by the presence of microbes in the mucous membrane of the nose. This has led to the nasal treatment of the malady, a method which has found many followers.

rowing the language of the *Lancet* (modified in a few particulars), this author

"has succeeded in finding and cultivating what he believes to be the true bacillus of whooping-cough. This microbe differs distinctly from all other bacteria which have been described (Fig. 1). It is somewhat like Friedländer's pneumonia bacillus, but is shorter and thinner than the latter; besides, in gelatine it does not form nail-shaped cultures, those which are produced having no hemispherical head. Its potato cultures, too, are quite different from those obtained from Friedländer's bacillus. Afanasieff's bacillus exhibits a remarkable degree of vitality, for jelly cultures that have become dry and have been kept for four months, appearing under the microscope to

FIG. 1.



Sputum from a case of pertussis. *P*, pus corpuscle containing the specific bacilli; *N*, nuclei from broken-down corpuscles; *B*, group of bacilli. (The ordinary atmospheric bacteria, often found in the sputum, have been omitted from this drawing.)

The discussion on whooping-cough, which occurred last year at the German Congress of Internal Medicine,<sup>4</sup> was an interesting debate on a very debatable subject. Vogel, Hagenbach, Michael, Heubner, Prior, Schliep, Sonnenberger, Binz, and Cohen, were the principal speakers. As already pointed out, the drift of opinion was in the direction of assuming the parasitic origin of the disease. No noteworthy discovery was announced, however, and as for treatment, there were about as many different opinions as there were participants in the discussion.

We come finally to the most recent pathological announcement, that of Afanasieff, which appeared in four successive numbers of the *St. Petersburger medicinische Wochenschrift*, in October, 1887. Bor-

be more or less destroyed, are still capable of producing fresh cultures when fresh media are inoculated from the dried mass. Dr. Afanasieff's researches were chiefly made from the sputum of some of his own children, who were affected with whooping-cough. The mouth was well washed out with a permanganate of potash solution, and the mucus coughed up after the next paroxysm or two examined. In this mucus, after staining with methyl-violet, and occasionally in the pus-corpuscles contained in it, the bacilli could be seen with a magnifying power of from 700 to 1000 (Zeiss's eye-piece 3 or 4,  $\frac{1}{2}$  oil immersion objective) as short rods (Figs. 2 and 3), sometime single, sometime in twos, or even in short chains running in the direction of the mucus, sometimes again in small clusters. Their length was from  $0.6\mu$  to  $2.2\mu$ . Other bacteria were also found. But they were numerically insignificant, as compared with the bacilli under consideration.

Pure cultures were easily made on agar-agar, meat-peptone jelly, potato, etc. Dogs and rabbits were

<sup>1</sup> Allgemeine Wiener med. Zeitung, August 10 1886.

<sup>2</sup> Lehrbuch der Kinderkrankheiten, 1883.

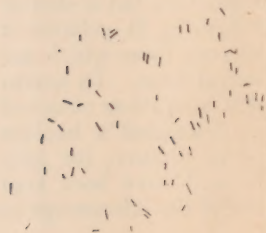
<sup>3</sup> Deutsche med. Wochenschrift, No. 5, 1886.

<sup>4</sup> Deutsche medizinische Zeitung, May 2, 1887.



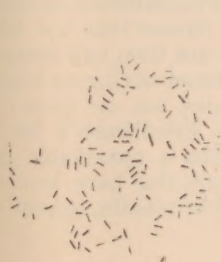
inoculated with a fluid culture mixed with chloride of sodium solution, some by means of injections into the trachea, others by direct injections into the lungs. All the animals were seriously affected, and many of them died. The symptoms were some-

FIG. 2.



Pure culture of the bacillus pertussis on agar-agar, twenty-three days old. (After Afanasieff.)

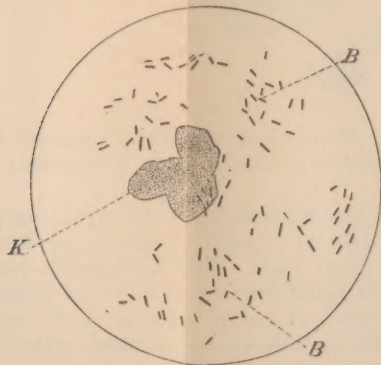
FIG. 3.



Pure culture of the bacillus pertussis on potato eleven days old. (After Afanasieff.)

what similar to those of whooping-cough, including cough, dyspnoea, and redness of the eyes. Many of the cases were complicated by broncho-pneumonia. On examining the bodies of those animals which died, the mucous membrane of the air-passages was found much reddened, and coated with a tenacious clear mucus, in which, as well as in the pneumonic patches in the lungs, the bacilli were found (Fig. 4). Similar appearances and the same bacilli were observed in the bodies of children who had died from whooping-cough."

FIG. 4.



Specimen taken from a patch of broncho-pneumonia artificially induced in a rabbit. *K*, pus corpuscle; *B*, bacilli pertussis. (After Afanasieff.)

In my opinion the bacteriological researches of this Russian observer are far more important and convincing than any hitherto undertaken.<sup>1</sup>

<sup>1</sup> If I may be permitted a personal remark in this place, it is that I know the author to be a most careful, painstaking, and conscientious observer. Twelve years ago while we were studying together at Strasburg, under the supervision of Waldeyer and v. Recklinghausen, I had ample opportunities to admire the excellence of all his laboratory work. Afanasieff is the author of numerous contributions to histology and pathology, that have always been favorably received by recognized authorities.

The discovery of Afanasieff has been confirmed by a Russian observer, Semchenko. His papers were published in the *Vrach*, and the *Lancet* of January 7, 1888, mentions his views as follows:

"Dr. Semchenko, having investigated the whooping-cough bacteria described by Professor Afanasieff, has satisfied himself that they are the true specific cause of the affection. They appear in the sputum on the fourth day of the disease, if not still earlier. They go on developing in the tissues of the body, and simultaneously with their multiplication the severity of the disease increases. The bacteria disappear before the paroxysms of whooping-cough have ceased, generally when these have been reduced to from two to four in the twenty-four hours. When complications, such as catarrhal pneumonia, arise, they are accompanied by a great increase in the number of whooping-cough bacilli found in the sputum, the pneumonia developed under these circumstances having, according to Dr. Semchenko, several points of difference from ordinary attacks of catarrhal pneumonia. The examination of the sputum of whooping cough patients is apparently useful, not only for diagnostic purposes, but also as a guide to the prognosis of the course of the disease."

My own experience with the bacillus described by Afanasieff permits me to state that it is probably always present in pertussis. In the few cases in which I failed to find it, the method of obtaining the sputum was very likely at fault. I am unable, however, to confirm the assertion of Afanasieff, that the small pellet of mucus which is coughed up at the end of a paroxysm contains the pertussis bacilli in almost pure culture. I have invariably found other varieties of bacteria (such as commonly occur in the sputum of bronchitis) along with those of whooping-cough.

Moreover, it has not been my fortune to be able to demonstrate the bacillus pertussis, except in those cases where the clinical features of the disease were already so well marked, that a microscopical confirmation was not needed. Hence, I cannot agree with Semchenko in ascribing any great diagnostic significance to the discovery of these bacilli in a given case.

I had occasion to examine the sputum from a few cases of suspicious cough, that later developed into characteristic pertussis, but in none of them could I find the bacillus of Afanasieff, during that early stage.

Again, in two cases that were on the high-road to recovery I still found as many bacilli as during the height of the disease. In this respect also, my own observations are at variance with those reported by Semchenko.

I, nevertheless, have no doubt concerning the etiological significance of Afanasieff's discovery. But what practical benefit will result therefrom to the practitioner of medicine remains to be seen.



We certainly require no bacillus for diagnostic purposes.\* And in cases which are as yet doubtful, the bacillus is not found. At least such has been my rather limited experience.

Before closing this short account of recent pathological views on whooping-cough, mention should be made of the observations of v. Herff,<sup>1</sup> which are not without interest. This author, while suffering from pertussis, studied the appearance of his own larynx. According to him, there exists, during the entire course of the malady, a moderate amount of inflammation of the mucous membrane of the respiratory organs, from the posterior nares down to the bifurcation of the trachea. At the outset of the disease, this inflammation is but a mild catarrhal one. It gradually increases in severity, and again abates during the period of defervescence. In his own case, the inflammatory action was quite intense at the arytenoid cartilages and those of Wrisberg and Santorini. But the posterior wall of the larynx between the vocal cords, and the under surface of the epiglottis, were most severely affected. The vocal cords themselves appeared intact.

During the paroxysms, v. Herff claims to have seen a small pellet of mucus on the posterior aspect of the larynx, and on a level with the vocal cords. On removing this pellet the paroxysm came to an end at once. Irritation of this part of the larynx induced an attack. But a paroxysm was not produced by irritating other parts of the larynx. The author maintains, therefore, that this inflammatory action in the interarytenoid space is responsible for the spasmodic attacks characterizing pertussis. About the probable lodgement of microbes at this point he is strangely silent for a modern observer.

On examining the modern therapy of pertussis, we shall find that, in addition to the countless old remedies, almost every new drug has been tried. That the curability of an affection varies inversely in proportion to the number of remedies employed in its treatment is a trite experience. Judged by this rule, whooping-cough must still be regarded as a very intractable malady.

For obvious reasons, no attempt will be made, in this place, even to mention all the drugs that have been tried and recommended in pertussis, let alone discuss their merits.

Whatever is regarded by physicians as the essential something of the disease, that they have proceeded to attack. Those who look upon the infectious element as the chief factor of the disorder, naturally chose, and still choose other means of treatment than those who consider the respiratory catarrh as most important, or than those who hold that the morbidly heightened nervous irritability is chiefly responsible for the trouble. Those, finally, who

believe in the parasitic origin of pertussis have recourse to one or another of the various antiseptics or parasitocides. Mention has already been made of the nasalists, who direct all their efforts against the offending mucous membrane of the nose. They employ for this purpose sprays and insufflations of various antiseptics and sedatives. This treatment is said to prove very successful. In an editorial notice touching the nasal treatment of pertussis, the *Lancet* of January 15, 1887, says, "It is doubtful whether the theory of this fashionable method is correct; but, supposing it should be, it is equally dubious whether the good that results may not be from the mere treatment of catarrh as such, apart from its supposed cause." I fully concur in this view of the alleged success attending this method of treatment in whooping-cough.

It was at first proposed to place the various remedies in groups, a plan which has been followed by Chéron.<sup>1</sup> But the groups soon grew to such formidable proportions that the limits of this paper would have been unnecessarily extended, had that idea been carried out. I have preferred, for this reason, to examine only a few methods of treatment, and to present for consideration my personal views as to what constitutes rational therapy in the present state of our knowledge.

To begin with, whether we accept the parasitic doctrine of the disease or not, I believe that the policy of absolute non-interference, still persistently advocated in some quarters, should be emphatically condemned. If we cannot attack the affection at its roots, something can surely be done to mitigate its severity and to reduce the frequency of complications. There is probably not one among us who has not witnessed the sad plight that neglected cases will sometimes fall into. I would ask whether the large mortality still ascribed to pertussis is not, in a great measure, due to irrational medication rather than, as some maintain, to over-treatment?

It goes without saying that proper alimentation and the best hygienic conditions attainable, will always contribute toward the success of any plan of treatment. How difficult of accomplishment these measures are among the poor and shiftless, is only too well known. But, even among the better classes, the necessity of pure light, of fresh air, and of proper food, furnishes a text for almost daily preaching.

I am a firm believer also, in the propriety, or rather the necessity, of employing every possible means of protection for the unaffected members of a family. The time is surely past when the profession can countenance the opposite custom of encouraging the contagious diseases of childhood to affect as many members of one family at a time as possible. The mother may be anxious "to be done" with a

<sup>1</sup> Deutsches Archiv f. klin. Medizin, vol. xxxix.

<sup>1</sup> L'Union Médicale, October 18 and 20, 1887.



particular disease for her offspring. But I conceive it to be our duty to oppose energetically all such dangerous nonsense, even at the risk of incurring the wrath of some wiseacre guardian of the nursery.

As to particular drugs in the management of pertussis, I believe that individual preferences in respect are often the result of accidental causes. We certainly possess no specific for pertussis. It is to be remembered that there are seasonal and other variations in the intensity of the disease. If we accept the bacterial origin of pertussis, this varying degree of severity would depend upon the degree of infection. Some such explanation certainly appears necessary, in view of the fact that equally honest observers do not obtain equally good results from the same drugs.

Turning now to medicines, we find that narcotics and sedatives are as largely employed as ever. Many new combinations have indeed been put forward, but it does not appear that special virtues belong to any particular drug.

Vetlesen<sup>1</sup> has warmly advocated the use of belladonna combined with cannabis indica. He tells us that in 116 cases he obtained excellent results 83 times. In 30 patients the disease lasted only from 8 to 14 days. I have no personal experience to record with this combination, but on general principles I am hopelessly sceptical concerning such surprising results. I may say, in this connection, that I have employed belladonna unstintingly, a few times unwillingly, to the danger-point. Yet, I have never seen it shorten the duration of the disease, although the severity of the spasmodic cough was favorably influenced.

The bromides and chloral have found favor with many writers. For myself I have come to regard them as indispensable in the severer cases. I have fearlessly employed them alone or in combination.

The action of cocaine, locally as well as internally, is extolled by numerous observers. Prior recommends as highly efficacious, solutions having a strength up to 30 per cent., to be applied with a brush, to the pharynx and larynx. I have feared to employ the stronger solutions of cocaine, and the weaker ones (up to 4 per cent) have not given me much satisfaction.

By several writers the various salts of quinine (Binz, for example, favoring large doses of the tannate) have been strongly urged for internal as well as local use. My own experience with quinine is so slight that I am not justified in commenting on its utility.

Carbolic acid, iodoform, corrosive sublimate, resorcin, the salicylates, pure benzol, eucalyptus, thymol, boric acid, in fact every known antiseptic and parasiticide, has found its champion. Why any particular member of this group should be so much

more beneficial than all the others, I am unable to comprehend. The use of antiseptic sprays, provided always that the patients are old enough to tolerate the necessary manipulations, would appear to be a rational means of procedure. I am bound to confess, however, that in my hands they have yielded less flattering results than I anticipated, after reading the glowing accounts of the successes of others.

I would put these questions before you: If pertussis is due to the irritation of toxic substances (ptomaines) produced by specific microbes, are we really fulfilling the indications of the disease, by incorporating other poisons into the system, impotent to kill the bacteria, but yet powerful enough to harm the young patients?

In other words, is not this much-vaunted specific medication of pertussis an illusion and a snare?

Is it not, after all, more rational so to fortify the system, that in what has been termed the "cellulo-microbial warfare," the cells may be the victors and not the vanquished?

Is it not safer and easier to assist the cells to fight their battle, than to attempt to kill the rapidly multiplying bacteria that are already lodged within them?

Although I have deprecated the habit of recommending particular drugs on the strength of gratifying personal experience, I cannot refrain from alluding to the use of antipyrin in pertussis. Dr. Sonnenberger,<sup>1</sup> of Worms, was the first to call attention to this new drug in the treatment of whooping-cough. He claimed such surprisingly good results from its employment that my sceptical faculty was immediately fanned into activity. Nevertheless, so far as my own limited experience goes, I must own that antipyrin has with me a better record than any other one drug. I can claim no cures from antipyrin. But what the drug has appeared to me to favor, was an easy course of the disease to final recovery, a mitigation of the paroxysms, especially at night, possibly a reduction in their number, and certainly a freedom from complications. This is higher praise than I can conscientiously bestow upon any other method of treatment. But I am far from claiming as much as Sonnenberger, for antipyrin, that author asserting it to be distinctly curative. As to the method of its employment, I have followed the directions of Sonnenberger, who gives one-seventh of a grain to very young children, and gradually increases the dose according to the age of the child. To adults he gives fifteen grains. The medicine is administered three times daily, and sometimes once during the night. Children take it readily when dissolved in a little water and raspberry syrup. The remedy should be continued throughout the attack.

<sup>1</sup> Norsk Mag. f. Laegevidenskaben, No. 6, 1886.

<sup>1</sup> Deutsche med. Wochenschrift, April 7, 1887.



I have said nothing about fumigation with sulphurous acid, a method urged for adoption by Mohn,<sup>1</sup> because I have not tried it. Antiseptic inhalations and others, in the pneumatic cabinet, as particularly advocated by a Dutch physician,<sup>2</sup> may also be mentioned here. I have not employed this method, and doubt whether it will find favor with the profession.

When a French physician asserts in all seriousness, that he cures whooping-cough by cauterizing the ulcerations on the under surface of the tongue,<sup>3</sup> we can only assure him that French pertussis and American pertussis are distinct and different maladies. As a summary allow me to submit the following conclusions:

1. There is constantly associated with whooping-cough a special microorganism, discovered by Afanasieff.

2. This microbe is a small bacillus, having properties that distinguish it from all other known bacteria.

3. The "bacillus pertussis" (*bacillus tussis convulsivæ Afanasieff*) can be readily demonstrated in the sputum of patients having the disease.

4. While its etiological significance appears established, it does not possess much diagnostic importance, since it is found only after the clinical features of the disease are already well marked.

5. The treatment of pertussis has not yet been materially advanced by this discovery.

6. Antiseptics locally applied do not appear to shorten the duration of the disease.

7. Hygiene and judicious alimentation are, in the present state of our knowledge, of, at least, equal importance with medicinal treatment.

8. Antipyrin and the bromides are reliable symptomatic drugs, and are devoid of danger.

9. A specific has not yet been found.

10. Abortive forms of pertussis may occur, but no plan of treatment now known can claim to have abortive efficacy.

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#### CONSIDERATIONS ON THE PATHOLOGY OF THE CÆCUM AND APPENDIX.<sup>4</sup>

BY JOSEPH RANSOHOFF, M.D., F.R.C.S.,  
OF CINCINNATI.

WHEN Dupuytren,<sup>5</sup> in 1826, had first called attention to the relation of pericæcal abscesses to those of the right iliac fossa, observations in this field were rapidly instituted by continental writers. In 1830

Goldbeck,<sup>1</sup> of Heidelberg, first suggested the term perityphlitis for all the inflammatory conditions of this region. In 1834 a step was taken in the right direction when Copeland<sup>2</sup> first differentiated lesions of the cæcum from those of the appendix, and another by Albers,<sup>3</sup> who first described that special form since known as "typhlitis stercoralis." In 1836 and 1838 John Burne<sup>4</sup> contributed, in two excellent articles, further knowledge concerning lesions of the cæcum and appendix. Within recent years particularly numerous articles on the diseases of this region have appeared, and as a result their proper nomenclature is being gradually determined.

There are most excellent reasons, anatomical and clinical, for separating inflammations here present, into those of the cæcum and those of the appendix; each to be subdivided into those of the part itself and those of its peritoneal investment. There is, it appears, a rational basis for the use of the terms typhlitis to indicate inflammation of the cæcum, perityphlitis to indicate a like condition of its serous coat. Appendicitis, following in the path of With<sup>5</sup> and Fitz,<sup>6</sup> should be reserved for inflammation of the appendix, and peri-appendicitis or appendicular peritonitis for that of its peritoneum.

Of the varieties of cæcal and appendicular inflammation, those of the appendix are of far more frequent occurrence in grave cases than those of the cæcum proper.

Yet it is equally certain that typhlitis is far from uncommon, although mortuary records fail to show it. In the investigations of the anatomy of the part, I was struck by the frequency with which evidence of chronic catarrh, in the form of patches of indolent venous coagulation, pigment spots, and superficial abrasions were encountered in the cæcum. In all such instances the scybalous contents were covered with a layer of opaque mucus. This catarrhal condition is by no means confined to those who are habitually constipated, but is often encountered in the young, in whom the dependent position of the cæcum makes it a favorite seat for the retention of indigestible food. From this condition there is only a step, though a long one, to the typhlitis stercoralis of German writers, which, though doubtless of frequent occurrence, generally ends in recovery, and is, therefore, not anatomically demonstrated.

Given, however, a continuance of the cause, which, in contradistinction to that of peri-appendicitis, is rarely a foreign body, and the erosion be-

<sup>1</sup> Revue des Sciences médicales, and London Medical Record, February 15, 1887.

<sup>2</sup> Arntzenius, in Weekbl. von het Nederl., etc., No. 67, 1887. See Therapeutic Gazette, October 15, 1887.

<sup>3</sup> Gazette des hôpitaux, and Revue de Laryngol.

<sup>4</sup> An extract from a paper read before the Surgical Section of the American Medical Association, May 9, 1888.

<sup>5</sup> Leçons Orales, v. iii. p. 12.

<sup>1</sup> Ueber eigenthümliche, entzündliche Geschwülste in der rechten Hüftbeugegend, 1839.

<sup>2</sup> Dictionary, vol. i. p. 277, quoted by Fitz.

<sup>3</sup> Beobacht. auf dem Gebiete d. Pathologie.

<sup>4</sup> Medico-Chirurg. Trans., vol. xx. p. 201, and vol. xxii. p. 33.

<sup>5</sup> London Med. Record, 1880, p. 213, quoted.

<sup>6</sup> Amer. Journ. of Med. Sci., vol. 92, p. 321.